REMARKS

This amendment is responsive to the Final Office Action[1] of December 28, 2004

Claims 1, 4-6, 9-10, 12-15, 17-20 and 22-32 were presented for examination. Claims 20

and 22-29 are allowed, which Applicants acknowledge with appreciation. Claims 1, 4-6,

9-10, 12-15, 17-19, and 30-32 are rejected. Claims 1, 5, 6, 9, 10, 15, 17 and 30 are

amended for clarification purposes only; no new matter is added; support for the

amendments can be found in the specification as filed, e.g., paragraphs [0011] and

[0025], and Fig. 2. Claim 4 is amended to remove its dependency from a previously

canceled claim. No claims are added. None of these presented claims was withdrawn or

canceled. Thus, claims 1, 4-6, 9-10, 12-15, 17-20 and 22-32 are pending.

Claims 1, 4-6, 9-10, 12-15 and 30 are rejected under 35 U.S.C. § 102(e) as being

anticipated by Fanty et al. (U. S. Patent No. 6,535,851, hereinafter "Fanty"). Claims 17-

19 and 31-32 are rejected under 35 U.S.C. § 103(a) as being un-patentable over Fanty.

Applicants respectfully traverse these rejections for reasons given below.

As explained in the previously-filed response (filed August 26, 2004), Applicants'

claimed subject matter relates to determining the difference between the number of peaks

appearing in a first cepstral coefficient plot and the number of peaks appearing in a

subsequent cepstral coefficient plot (Number of Peaks Difference or "NPD"). In Fig. 2 of

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[1] The Office Action may contain a number of statements characterizing the cited reference(s) and/or the claims which Applicant(s) may not expressly identify herein. Regardless of whether or not any such statement is identified herein, Applicant(s) does not automatically subscribe to, or acquiesce in, any such statement. Further, silence with regard to rejection of a dependent claim, when such claim depends, directly or indirectly, from an independent claim which Applicant(s) deems allowable for reasons provided herein, is not acquiescence to such rejection of that dependent claim, but is recognition by Applicant(s) that such previously lodged rejection is moot based on remarks and/or amendments presented herein relative to that independent claim.

Applicants' specification, which illustrates a plot of cepstral coefficients for a frame of

audio data consistent with the present invention, three peaks are shown and identified in

the Figure as peak 215, peak 220 and peak 225. Thus, in Fig. 2, the NUMBER of

identified peaks is THREE. In a subsequent plot reflecting cepstral coefficient data for

another frame of acoustic data, e.g., the next successive frame, there may be the same

number of peaks or a different number of peaks, for example, possibly two peaks,

possibly four peaks, or possibly ten peaks or some other number of peaks. An important

insight or discovery of Applicants is that "The NUMBER of cepstral coefficient peaks

change rapidly on frames corresponding to phoneme boundaries." (Specification,

paragraph [0026], lines 15-16, Emphasis added). Therefore, it is more likely that a

phoneme boundary would correspond to a change in frames reflecting, e.g., a three to ten

peak change, than with a change in frames reflecting e.g., a three to four peak change.

Applicants' claimed subject matter is based on a peak difference measurement, from any

number of peaks to any number of peaks, e.g., from three peaks to four peaks, or from ten

peaks to two peaks, etc.

Consider currently amended claim 1:

A method of segmenting acoustic data for use in a speech
recognition process, comprising: receiving frames of acoustic data; determining
cepstral coefficients for each of the received frames of acoustic data; determining
a *number of peaks* in a plot of the cepstral coefficients for each received frame of
acoustic data; and segmenting the received frames of acoustic data based on the
determined *number of peaks* in the plot of the cepstral coefficients. (Emphasis
added.)

Claim 1 clearly recites a method which is dependent upon NUMBER of cepstral

coefficient PEAKS in received acoustic data frames. The received frames are segmented

based on the determined number of peaks. This is not disclosed or suggested in Fanty.

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Fanty is a segmentation approach for speech recognition systems (title). A set of candidate phonetic units have boundaries that are determined based, *inter-alia,* upon changes in Cepstral coefficient values (abstract). Change in <u>values</u> of Cepstral coefficients is not the same as, or in any way similar to, a change in the <u>number of peaks</u> in successive plots of cepstral coefficients, i.e., NPD[2]. Fanty may have similar-sounding language to that recited in Applicants' claims, but the meaning of the Fanty language is completely different from the subject matter claimed by Applicants.

"After the Cepstral coefficients have been scaled, the Cepstral coefficients are analyzed to identify boundaries in the frames. Analyzing the frames generally involves comparing N number of frames to the left and right of each possible boundary (a boundary separates two frames) to determine whether the current frame (by convention, the frame right of the boundary being considered) contains *a peak in some difference measure*. As used herein, a *peak is defined as a local maximum* that exceeds a specified threshold with a sufficiently large drop on either side." (Fanty, Col. 5, lines 16-25, Emphasis added.)

The above-quoted section of Fanty is under the sub-heading of "Cepstral Difference" which is directed to differences in Cepstral coefficient values or magnitudes. In the above-quoted section, the phrase: "a peak in some difference measure" is quite different from number of peaks difference (NPD). The former phrase is directed to the measuring of two Cepstral coefficient values, or quantities related thereto, to obtain a difference value between them and then determining whether a peak or local maximum of that difference value exists in the current frame. For example, if such values or quantities in Fanty were labeled "X" and "Y", the phrase in Fanty is directed to determining if X minus Y is a maximum in the current frame. By contrast, Applicants'

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[2] In the specification, e.g., in paragraph [0030], the number of cepstral peaks for the current frame subtracted from the number for the previous frame is NPD and may be greater than a value "δ", where "δ", is discussed in the specification.

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disclosure is directed to a difference between a first number of peaks (e.g., three) in a plot

of a first frame of Cepstral coefficients and a second number of peaks (e.g., five) in a plot

of a second frame.

Thus, in Fanty, one is looking for <u>A PEAK IN THE DIFFERENCE NUMBER,</u>

but in Applicants' invention one is looking for <u>A DIFFERENCE IN THE PEAK</u>

<u>NUMBER.</u> Clearly, these are two very different measurements.

In the Final Office Action, page 2, it alleges that "Determining peaks in the

cepstral coefficients" can be found in Fanty in column 5, lines 42-45:

> "In step 410, the differences measured in step 408 are searched in a left to
> right manner in order to find local maxima or *peaks in the difference measure*
> which are larger than the nearby local minima by more that a threshold amount."
> (Emphasis added.)

This section of Fanty discusses finding peaks in the difference measurement but, as

presented above this is not the determining of peaks that Applicants are reciting.

Although the term "peak" is used in both instances and although cepstral coefficients are

involved in both instances, the two measurements are completely different. In Fanty, the

term "peak" is referring to a local maximum in the measurement of value-difference

between cepstral coefficients. In other words, where and when does the cepstral

coefficient difference between frames show a maxima or peak? Clearly, this is not what

Applicants are measuring.

In Applicants' claims, Applicant is measuring the number of peaks difference. In

other words, in Applicants' invention, the number of cepstral coefficient peaks (e.g.,

three peaks) in a first frame (current frame) are counted and the number of cepstral

coefficient peaks in a second frame (e.g. seven peaks) are counted, and "peak difference"

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or "peaks difference", which means a "difference in the number of peaks" (i.e., four

peaks in this example), is determined. Applicants' specification describes a peak-count

difference and does not describe a maximum value difference. The Fanty disclosure is

related to determining a value difference between cepstral coefficients and then looking

for a peak (maximum) difference in those values, (i.e., when that difference is

maximum), and that has virtually nothing to do with Applicants' claimed subject matter.

As noted in a previous response, Applicants' insight into the claimed subject

matter based on NPD necessarily takes into account the fact that relative magnitude and

relative phase between consecutive frames do not matter in terms of providing useful,

reliable, and accurate results when employing NPD. Applicants gained such insight by

examining and considering cepstral coefficient frames and boundaries and after

thoughtful effort, arriving at the unique and novel realization that relative magnitude

and/or phase differences of the cepstral coefficients from frame to frame are irrelevant for

phoneme boundary segmentation. NPD is a technique that takes advantage of this

realization and is function that has these special properties.

In view of the above, it is respectfully submitted that Applicants' claim 1 is not

disclosed or suggested by Fanty. For example, Fanty does not disclose or suggest:

"determining a number of peaks in a plot of cepstral coefficients for each received frame

of acoustic data" as recited in claim 1. Fanty does not count the number of peaks of

cepstral coefficients plotted in a frame; instead, Fanty looks for maximum (peak)

differences in cepstral coefficient values. Also, Fanty does not disclose or suggest

"segmenting the received frames of acoustic data based on the determined number of

peaks in the plot of cepstral coefficients" as recited in claim 1, because there is no

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"determined number of peaks in the plot of cepstral coefficients" taught in Fanty. Any

segmentation performed in Fanty is based on peak (maximum) differences in cepstral

coefficient values measured from frame to frame, and not based on differences in count

of the number of peaks of cepstral coefficients plotted in those frames, from frame to

frame. Therefore, it is respectfully submitted that the 35 U.S.C. § 102(e) rejection of

claim 1 be withdrawn and the claim allowed. Claim 4 is dependent from claim 1 and is

likewise allowable, at least by virtue of its dependency from an allowable base claim.

Independent claims 5, 6, 10, 15 and 30 each contain language directed to

determining a number of peaks in a plot of the cepstral coefficients, or language related

thereto. Therefore, subject matter recited in these claims is not disclosed or suggested by

Fanty, where these claims are allowable for the same reasons given above with respect to

claim 1.

Claim 9 is dependent from claim 6, claims 12-14 are dependent from claim 10

and claims 17-19 are dependent from claim 15. These dependent claims are allowable, at

least by virtue of their dependencies, directly or indirectly, from allowable base claims.

Independent claims 31 and 32 each contain the language: "receive frames of

acoustic data and determine a number of peaks of cepstral coefficients for each of the

received frames." This language is similar to that discussed above with respect to claim

1, and these claims are allowable for the same reasons given above with respect to claim

1.

As noted, claims 20 and 22-29 have been allowed.

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PATENT
Serial Number 09/826,715
Attorney's Docket No. 00-4023

CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully

requests the Examiner's reconsideration of this application, and the timely allowance of

all pending claims.

The amendments made herein merely clarify the subject matter being claimed, do

not change the scope of the claims, and do not necessitate further searching by the

Examiner. Accordingly, it is respectfully submitted that this amendment should be

entered under 37 C.F.R. § 1.116, at least for narrowing-down issues to be presented on

appeal if the Examiner is not fully persuaded by the amendments and remarks herein.

To the extent necessary, a petition for an extension of time under 37 C.F.R. §

1.136 is hereby made. Please charge any shortage in fees due in connection with the

filing of this paper, including extension of time fees, to Deposit Account No. 07-2347

and please credit any excess fees to such deposit account.

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